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NEW YORK  
ZOOLOGICAL  
SOCIETY  
ANNUAL REPORT



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SOCIETY  
SEVENTY-SIXTH  
ANNUAL REPORT  
1971

The Zoological Park, Bronx, New York



## Report of the President

**W**ith each passing year, the places on earth where the sight of a whale's flukes breaking the water or the sound of a lion's roar may be heard diminish. Somehow, the inexorable diminution of wildlife makes the New York Zoological Society's great collections of living, breeding wild creatures in the heart of New York City more precious and more meaningful, their sight more joyous, and their care more compelling.

Although a tremendous new groundswell of public concern with the fate of wild creatures is now tending to uplift and encourage the Society's programs, it is tragic that such philosophical support seems always to respond to problems so far progressed.

Nevertheless, the Zoological Society has found the past year one of great encouragement and progress, of renewed support and development. Never before have the institutions and their staffs been better equipped to respond to the needs of environmental education, research, and wildlife conservation, if adequate financial foundation may continue to be found for our programs.

The staff reports which follow detail exciting new plans and stimulating achievements. We have also outlined serious problems and noted necessarily effected economies. The most significant of the latter is the closure of the Society's Department of Tropical Research in Trinidad, which was established by the great William Beebe.

During the past year, Charles W. Nichols, Jr., who has served the Society in so many capacities, was elected a Vice-President, and John Macomber was elected to the Board of Trustees. Unfortunately, with the death of Charles W. Engelhard, the Society lost a valued member of its Board and a good friend.

As the New York Zoological Society moves toward the last quarter of the twentieth century, it continues to have the help and support of its Board of Trustees, General Director William G. Conway, his able and dedicated staffs, and the concerned and loyal membership.



Robert G. Goelet



## Report of the General Director

**1971** was an exceptional year in the life of the New York Zoological Society, as the following reports concerning the daily biology of the Society's collections and the esoteric pursuits of its scientists clearly show. The Society emerged from the year more active and better equipped than ever to pursue its objectives in education, conservation, and research, and more aware of the challenges ahead.

### The Future of Wildlife

The future of wildlife in nature is dependent upon protection from over-hunting and conservation of suitable habitats. Although education and research, followed by sensitive legislation, recently have made substantial gains, the effort to conserve and protect wildlands on a world-wide basis has been feeble. At this time, there is no justification whatsoever for optimism about the future of most large wild mammals, birds, and reptiles.

For practical purposes, almost all land intensively developed and populated by man has been and will be subtracted from wildlife habitats, and wild animal numbers and species decrease proportionately. No real end to development is generally contemplated even in the United States — the dire forecasts of ecologists notwithstanding — and no such idea is likely to be acceptable in the undeveloped nations which now hold the last concentrations of truly spectacular wildlife. These facts, combined with man's rapid population growth and technological development, make it clear that the remainders of most large wild animal populations will soon be confined to national parks, except where they are managed intensively for some commercial end, or have no commercial value and fail to conflict in any way with man. Species for which parks are not provided may soon be exterminated or maintained only in captive collections.

Because few present-day parks may be considered ecologically stable environments or large enough to allow for substantial breath in habitat succession, it seems likely that they will have to become intensively-managed, essentially artificial, captive environments. Naturally, the long-term persistence of parks will depend upon the political stability and economic viability of their localities as well as the priority they are accorded in the future panoply of governmental structures.

Where great wide-ranging predators are concerned, even parks are un-

likely to provide sanctuary from man. Humanity in dense concentrations will not long countenance tigers and crocodiles as neighbors. For these animals and many others it may be that only zoo populations will survive for a significant period.

Ironically, as wildlife disappears, interest in it and in zoo collections increases, and so also do the educational responsibilities of zoos and the need to reproduce vanishing species in captivity. Nevertheless, the social and environmental ills of the over-crowded big cities which house the great majority of zoos provide a sorely over-taxed matrix in which to flourish. The fact that zoos are well-suited to provide the kind of environmental consciousness and understanding upon which basic improvements in city conditions will have to be founded in no way obviates the fact that the future of zoos and aquariums is as reliant on that of their localities as are the futures of parks and wildlife preserves. Clearly, there is a need for a new kind of zoo: one that can be more self-supporting, serve wider audiences, and better meet the need to reproduce vanishing species.

Even the largest of urban zoos has insufficient areas to present the most exciting kinds of larger animals to zoo-goers in appropriate spaces and to maintain self-replacing breeding herds of animals. Moreover, recent census results show that American population concentrations are suburban and no longer confined to city cores. If institutions like zoos are to serve the people with educational and recreational facilities, they must branch out.

Already a large number of "drive-through" zoos have sprung up in western Europe and the United States. These cover large areas through which visitors drive, or are conveyed, and in which the animals are given more space. Although many of these new zoos are badly managed, their popularity and the effect upon their visitors are undeniable, and they have proven immensely profitable. Unfortunately, none of these safari-type zoos yet has a significant long-term breeding program for its animals or educational program for its visitors. The responsibility of the New York Zoological Society to establish its own wildlife-park/survival-center, while land and opportunity still permit, is clear if the Society is to fulfill its charter obligations.

During 1971 the new Aquarium set an all-time attendance record. The Zoo recorded below-average attendance, as a result of gate counting difficulties (where new photo-electric counters were shown to be under-counting on some days by as much as 27 per cent) as well as consistently rainy weekends.

The popularity of the World of Darkness continued at a remarkable level. To support the additional guard-ushers required by the building and to police its dark corridors, a 10¢ admission fee was instituted. Admission in the Zoo as a whole was raised from 75¢ to \$1.00 on paydays for adults in another attempt to fill the budget gap left by declining New York City

## **A New Kind of Zoo**

## **1971 at the Zoo and the Aquarium**

support. City aid was reduced approximately 11 per cent during the fiscal year and, for the first time, traditional city-supported positions were deleted from the Society's program by the City. Highlights of the Zoo and Aquarium are noted in the reports that follow.

## **Education**

A reorganization and expansion of the Society's education department led to the productive programs detailed in the departmental report. Of these, the volunteer effort, organized through the aid and support of the Friends of the Zoo, represents a major breakthrough. It will be the subject of a detailed review in the 1972 report. The new programs were made possible by generous grants from the New York State Council on the Arts and the Charles E. Merrill Trust. Dr. F. Wayne King was appointed Chairman of Educational Programs for the Society and Dr. James W. Waddick was appointed Assistant Curator. Curator Herbert J. Knobloch assumed additional responsibilities as Community Affairs Officer.

In the spring, the Zoo became host for meetings of various professional groups. The national meetings of the American Association of Zookeepers and the Northeast Regional Workshop of the American Association of Zoological Parks and Aquariums were both held at the zoo in May. A useful symposium of local museums was arranged through the interest and support of the New York State Council on the Arts.

## **Conservation**

The Society's efforts in wildlife conservation have become increasingly significant in its overall activity. Today, there is little that the Society does that is not somehow related to the protection and conservation of wild creatures. A special report has been prepared below.

## **Scientific Research**

Although the Osborn Laboratories of Marine Sciences have continued unchanged, great revisions were made in the Society's other scientific programs during 1971. On June 30, Simla, the Tropical Research Station in Trinidad, was closed. In recent years, the Station had been a part of the Institute for Research in Animal Behavior; historically, it was the center of the Society's Department of Tropical Research which had been formally initiated by William Beebe in 1916. Changing research emphases combined with environmental and budget problems led to a decision to close the Station.

At the same time, plans were laid to discontinue the Institute for Research in Animal Behavior in its present form at the Zoological Park and to initiate a new Center for Field Biology and Conservation, which would devote its primary efforts to field studies on habitats and species where such work could be productive and useful in the Society's especial concern with wildlife conservation. This new emphasis is an attempt to respond to the fact that the days of field science in relatively undisturbed habitats now appear distinctly limited. The reorganization has been made possible by generous grants from the Scaife Family Charitable Trusts, which have

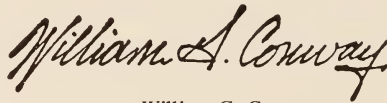
been of continuing aid in the Institute's program. The Institute report outlines the new plans.

1971 saw the retirement of Membership Chairman Gordon Cuyler after 24 years of devoted service. He will be missed by a host of members and all of his former associates. He was succeeded by Harold C. Palmer.

The year also saw the retirement of Jocelyn Crane Griffin, Senior Research Zoologist of the Institute for Research in Animal Behavior. Although officially retired, Mrs. Griffin will still be involved in scientific research and publication of her work.

Emmet Winslow joined the Society as Personnel Manager. Promotions included the elevation of John L. Behler to Assistant Curator of Herpetology, Anthony DeSiena to Assistant Comptroller, H. Douglas Kemper to Assistant Curator of the New York Aquarium, and Joan Van Haasteren to Assistant Curator of Publications and Public Relations. Miss Grace Davall, who retired as Assistant Curator of Mammals and Birds in 1970, was appointed Curator Emeritus by the Board of Trustees, an honor richly deserved for her 47 years of service to the Society.

## Personnel

A handwritten signature in black ink, reading "William G. Conway". The script is fluid and cursive, with the first name "William" and last name "Conway" being more prominent than the middle initial "G".

William G. Conway

Attendance 1971	New York Zoological Park	2,160,116
	New York Aquarium	637,986

Combined Census		<i>Species &amp;</i>	
		<i>Subspecies</i>	<i>Specimens</i>
	Zoo	796	3,544
	Aquarium	202	1,386
	<i>Total</i>	998	4,930





*American Bison*



## Conservation Committee

Charles W. Nichols, Jr.,  
*Chairman*

Henry Clay Frick II  
Robert G. Goelet  
Gilbert M. Grosvenor  
Peter Matthiessen  
G. W. Merck  
Howard Phipps, Jr.  
Laurance S. Rockefeller  
Landon K. Thorne, Jr.

*Staff of  
the Zoological Society:*

William G. Conway  
Hugh B. House  
F. Wayne King  
Harold C. Palmer  
Roger S. Payne  
George Schaller  
Thomas T. Struhsaker

**F**rom its infancy, the New York Zoological Society has concerned itself with the conservation of wildlife. Its programs have ranged around the world, from the successful fight to protect the American bison at the turn of the century to the first significant American conservation efforts in Africa only a few years ago. Few of these efforts have been large in cost or scale, but their imaginative approach to conservation problems has frequently led to results out of all proportion to their size. The Society's policy has been to initiate and sponsor unusual and innovative projects.

The Society is uniquely equipped to make significant contributions in wildlife conservation, thanks to its scientific personnel and its animal collections. The conservation program is served by a scientific staff essentially unmatched among non-profit wildlife conservation organizations. They pursue their work in the murky waters of the New York Bight, in the Himalayan Mountains of Nepal, in the new Center for Field Biology and Conservation, in the Osborn Laboratories, and within the curatorial programs of the Zoological Park and the Aquarium.

The juxtaposition of great living collections from all over the world with a cadre of biologists devoted to conservation provides a constant flow of useful data. Such information has resulted in an international overview which makes the Society an exceptional resource in wildlife conservation education. Not the least of the Society's programs in wildlife conservation is its direct effort to breed and study endangered species in the Zoo. Progeny are successfully produced in many herds and flocks, including those of the European bison and Pere David deer, both extinct in their former natural habitats.

During 1971 an experimental breeding area for Pere David deer, European bison, and Mongolian wild horses was initiated with the aid of the Charles E. Merrill Trust. Conservation education programs at the Zoo and Aquarium included courses for children and adults, guided tours, and special events. For example, the generosity of the Culpepper Foundation makes possible the annual erection of an extinct "animal graveyard" on the Zoo's central mall, an idea now being adopted by zoos around the nation.

The significance of these programs is enhanced by the fact that one out of every ten American voters lives within fifty miles of the Bronx Zoo. The opinions of this huge vocal metropolitan population have an enormous effect, not only upon the attempt to preserve wild places and wild lands in this country but also upon legislation that will effect the fate of wildlife in other nations as well. The passage of the Mason Bill, which regulates the importation of endangered animals and their hides in New York State, was substantially aided by the Society's testimony. In this connection, it is interesting to note that the total number of tourist visits recorded at all national parks in Kenya, Uganda, and Tanzania combined is less than 10 per cent of the Zoo's average annual attendance. Unhappily, the only real familiarity that most people have with wild creatures occurs at zoos — yet the preservation of wild animals for future generations will depend upon these city dwellers.

Sound conservation programs must be based upon information from adequate study, whether they be environmental or legislative. For this reason, the Society's staff and programs have become increasingly action-oriented in conservation efforts. The diversity of these efforts is remarkable.

The scientific staff, especially Dr. F. Wayne King, Joseph Davis, and William G. Conway, have repeatedly appeared before state and national bodies to provide expert testimony on the skin traffic and on import and export legislation affecting endangered species. Through a ten-year series of papers presented before the American Association of Zoological Parks and Aquariums, Mr. Conway has effectively influenced zoo management of endangered species and zoo conservation education. The Society joined with the Natural Resources Defense Council and several other organizations in petitioning the federal Environmental Protection Agency to end the use of poisons such as 1080, strychnine, and thallium sulphate, against wildlife in the United States.

The first international meeting of the Crocodile Specialist Group of the International Union for the Conservation of Nature and Natural Resources took place at the Zoo and produced the first overall assessment of the status of world crocodilian populations. During the year, Dr. King published a key to the identification of crocodilian hides in *Zoologica*, the Society's scientific journal, that has become the standard reference in this field. Dr. George Schaller contributed to an international conference held in California on the behavior of the big cats. Dr. Roger Payne participated in the special conference on whale conservation convened in Virginia with the aid of the Society's Whale Fund. A manual on whale conservation was published by the Whale Fund Committee, chaired by Trustee Landon K. Thorne, Jr. The Whale Fund, aided by the National Geographic Society, made possible another expedition by Dr. Payne to study the endangered right whale off the coast of Patagonia.



*Formosan Sika Deer*

Dr. Thomas Struhsaker continued to work upon the ecology of Africa's rainforests and their primates, and increased his efforts to stimulate the development of rainforest parks. Not a single rainforest national park presently exists in Africa, although the rainforest is the most endangered of land habitats. The Society again entered into negotiations with Kenya in an attempt to have Amboseli Reserve declared a national park. Conservation Committee Chairman Charles W. Nichols, Jr., and Royal Little, a Benefactor of the Society, both traveled to Kenya to study the problem and meet with government officials. Mr. Little assumed the difficult task of raising funds for the project.

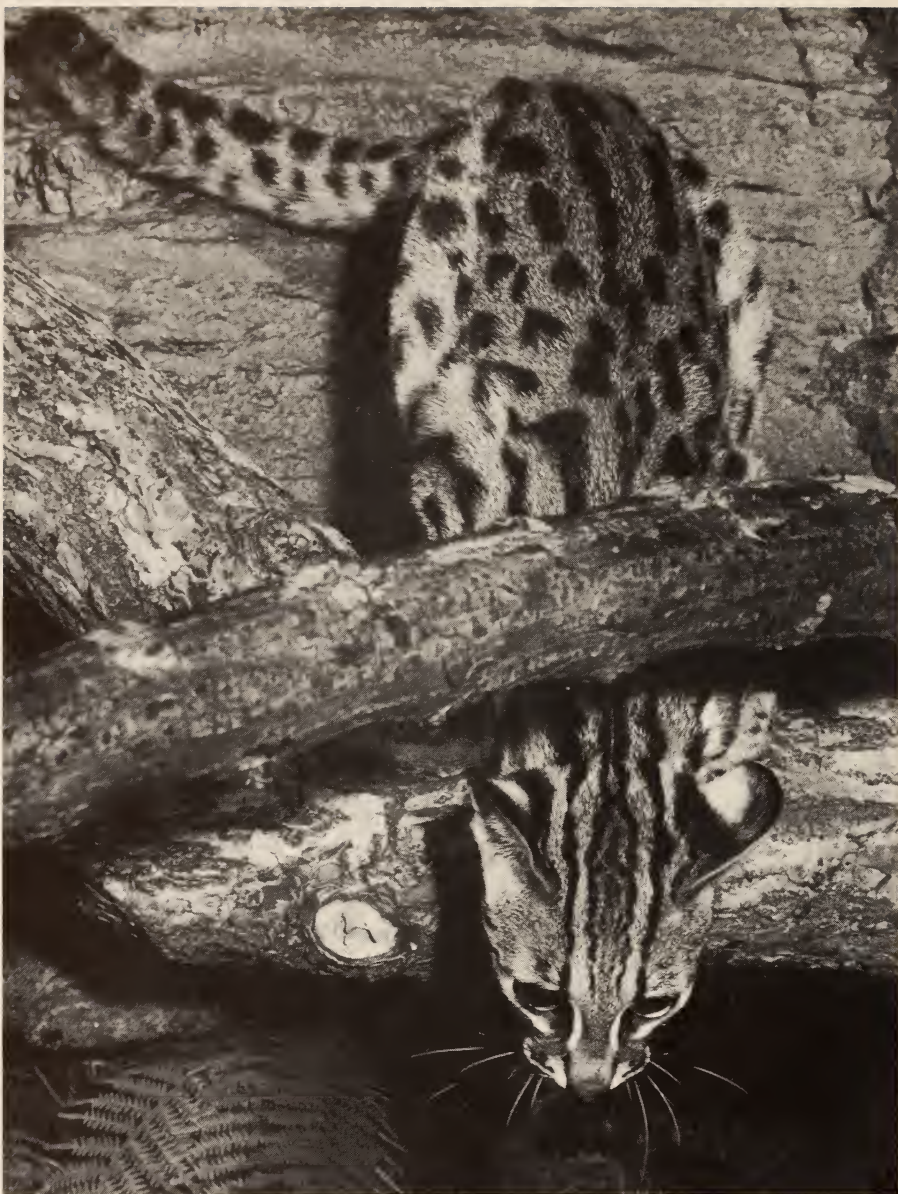
In addition to the staff programs noted above, the Society provided complete or partial support for the following projects. All of these efforts were made possible by the Society's restricted conservation funds and by generous donations.

- 71-001 Study of the status of the endangered Cuban crocodile by Dr. Howard W. Campbell
- 71-002 First international crocodilian conference in cooperation with the International Union for the Conservation of Nature and Natural Resources - Survival Service Commission.\*
- 71-003 Extension of research on the Komodo monitor by Dr. Walter Auffenberg.
- 71-004 Captive propagation of the mountain anoa by Hilmi Oesman, Surabaya Zoo, Indonesia.
- 71-005 Dr. Yasuo Hotta's travel expenses to Japan for the Society's whale conference program.
- 71-006 Final payment for the development of Tarangire National Park, Africa.
- 71-007 Study of the humpback whale off Bermuda by Dr. Roger Payne.
- 71-008 Right whale expedition to Argentina by Dr. Roger Payne.
- 71-009 Ecological research program by Dr. George B. Schaller in the Himalayan Mountains.
- 71-010 Ecological survey of the Cretan wild goat by Nikolaos Papageorgiou.\*
- 71-011 Partial support of the expenses of Ecuadorian national parks officials to attend Department of the Interior International "Short Course" on National Park Management.
- 71-012 Preparation and publication of crocodilian bibliography by Max Downes.\*
- 71-013 Dr. Federico Medem's study on the status of the South American crocodilians.\*
- 71-014 Dr. Hugh Cott's study on the nesting ecology of the Nile crocodile.\*
- 71-015 Expenses for Paulino E. Florio of Argentina to attend the Department of the Interior International "Short Course" on National Park Management.



- 71-016 Preservation of Dr. William T. Hornaday's conservation papers.
- 71-017 Support of the Charles Darwin Foundation in the Galapagos Islands.
- 71-018 Partial support for the study of the Mikado pheasant and Swinhoe's pheasant in Taiwan by Dr. Sheldon R. Severinghaus.
- 71-019 Ecological survey of the timber wolf in Minnesota by Dr. L. David Mech.
- 71-020 Population ecology of flamingos by Dr. M. P. Kahl.\*
- 71-021 Support of the international conference on the golden marmoset.\*
- 71-022 Study of the Asiatic white-naped crane and Japanese crane by George Archbold.
- 71-023 Ecological study of the aardwolf by Christen Wemmer.
- 71-024 International Conference on the Biology of Whales held at Shenandoah National Park, Luray, Virginia.

*\*The Charlotte Ordway Wildlife Protection Fund*



*Leopard Cat*



## Department of Mammalogy

**Hugh B. House,**  
*Curator*

**James G. Doherty,**  
*Assistant Curator*

**Robert A. Brown,**  
*Assistant Curator*

**Joseph Ruf,**  
*Animal Manager*

**Mario Rolla,**  
*Assistant Animal Manager*

**Robert Montana,**  
*Assistant Animal Manager*

**Grace Davall,**  
*Curator Emeritus*

**P**recisely 100 years ago, in 1871, the systematic destruction of the great western bison herds began and continued until the efforts of the Zoological Society and the American Bison Society, organized in the Bronx Zoo, brought protection in the early 1900s. It was therefore most fitting that one of the most significant new exhibits opened during 1971 was the new American Bison Range. When the bison, or buffalo, were moved to this new exhibit, they provided a stirring debut for television coverage. The entire herd exuberantly entered the large well-grassed area, and even the elderly animals bucked and gamboled like calves. It has proved a successful exhibit.

The second major mammal exhibit completed during the year was also greeted with enthusiasm — this time by the great apes in their new interior exhibit areas. The renovation of the Great Apes Building was the first time that simulated natural habitats had been built for gorillas and orangutans. At first, the five lowland gorillas displayed caution as they explored their new surroundings, but they were soon climbing on the fiber-glass vines and drinking from the running stream. The orangutans, however, were another story.

An experimental treetops exhibit for the “man of the woods” had been prepared for “Briggs,” a male orang. It was to be a prototype for a larger orangutan exhibit being planned for Tropical Asia. And as it turned out, no engineer could have been better chosen than Briggs to “work out the bugs.” Any defect, no matter how small, was soon discovered and brought to the attention of the mammal, exhibition, and construction departments by this master mechanic. Repairs and re-design were subsequently shown to be almost worthless. Although the human primates have managed to keep a step ahead of the great ape, the contest continues to provide a “Briggs-proof” exhibit.

In other projects, work was initiated on the complete renovation of much of the former Deer Range. Where before there were approximately 12 relatively small, wire enclosures, there will be three large exhibits, with associated animal management facilities, for the exhibition of breeding herds of three endangered species — wisent, Mongolian wild horse, and

Pere David deer. It is hoped that the exhibits will be complete by the summer of 1973.

The area around the old Kangaroo House, which is slated for the exhibition of South American animals, was landscaped, and next year guanacos, brockets, giant anteaters, collared peccaries, tapirs, capybara, Patagonian cavies, rheas, and various other species from this continental area should be on display.

In the mammal department, there were 153 births of 45 species during the year. This total again excludes the many births of three species of bats in the World of Darkness, as the department has still not mastered the problem of how to count flying bats without disturbing the collection. Especially significant births included a proboscis monkey (a delicate species that is seldom successfully maintained in captivity), two female wis-ents, and a brocket. In addition, two female nyala were born, the first viable females born since 1967 in a total of 36 consecutive young nyala. The African lions, "Princess" and "Charlie," produced another litter which represented their sixteenth and seventeenth cubs. It is, perhaps, also noteworthy that the two female raccoons at the World of Darkness produced and reared nine cubs between them.

Census of  
Mammals  
December 31, 1971

### Census

<i>Orders</i>	<i>Families</i>	<i>Species &amp; Subspecies</i>	<i>Specimens</i>
Marsupialia Kangaroos, phalangers, oposums, etc.	3	6	11
Insectivora Moles, shrews, hedgehogs, etc.	2	3	9
Chiroptera Bats	5	14	47
Primates Apes, monkeys, lemurs, marmosets, etc.	7	31	119
Edentata Armadillos, sloths, anteaters	3	5	9
Lagomorpha Pikas, rabbits, hares	1	1	1
Rodentia Squirrels, beavers, mice, porcupines, etc.	11	24	71
Carnivora Bears, raccoons, cats, dogs, otters, etc.	7	44	146
Pinnipedia Seals, sea lions, walruses	2	2	6
Proboscidea Elephants	1	2	3
Hyracoidea Hyrax	1	2	2
Perissodactyla Horses, tapirs, rhinoceroses	3	5	15
Artiodactyla Cattle, sheep, antelopes, camels, giraffes, deer, swine, hippopotamuses	7	32	364
Totals	53	171	803

Summary: orders, 13; families, 53; species and sub-species, 171; specimens, 803.



*Siberian Tigers*



*Snowy Egret*



## Department of Ornithology

**William G. Conway,**  
*Curator*

**Joseph Bell,**  
*Associate Curator*

**Donald F. Bruning,**  
*Assistant Curator*

**Robert A. Brown,**  
*Assistant Curator*

**Andrew Winnegar,**  
*Animal Manager*

**Eric Edler,**  
*Assistant Animal Manager*

**Grace Davall,**  
*Curator Emeritus*

**A**ll of the additions to the ornithology collection during 1971 were chosen with great care. Each pair or group of birds acquired was selected to serve a particular purpose in the new Lila Acheson Wallace World of Birds, either to fill a niche in one of the simulated habitats or to demonstrate some interesting facet of natural history.

Among the more interesting acquisitions were a large group of manakins (Pipridae), a New World family noted for unusual courtship displays; several pairs of Costa Rican quetzals (*Pharomachrus mocinno costaricensis*), spectacular trogons once held sacred by the Indians of Central America; and a particularly fine group of Australian birds, including magpie-larks (*Grallina cyanoleuca*), satin bowerbirds (*Ptilonorhynchus violaceus*), and several species of rosella parakeets (*Platycercus*).

With the aid of the staff at Cornell University's Laboratory of Ornithology, several fledgling eastern bluebirds (*Sialia sialis*) and red-headed woodpeckers (*Melanerpes erythrocephalus*) were obtained for a special exhibit in the new building, illustrating the displacement of some native birds by introduced species.

During the year a brown pelican (*Pelecanus occidentalis*) was sent to the Denver Zoo where there are several other specimens, and a bald eagle (*Haliaeetus leucocephalus*) was transferred to the Patuxent Wildlife Research Station for use in their bald eagle propagation project. The eagle, received in 1965, had been the subject of a sequence of plumage studies carried on at the park in cooperation with the National Audubon Society. Both the brown pelican and the bald eagle are endangered species.

The overall reproductive success of the collection was disappointingly low this year, but a number of very interesting hatchings helped to atone for the general deficit. Some of the more noteworthy rearings for the 1971 season were:

- 1 pileated heron (*Pilherodius pileatus*), rarely hatched in captivity, possibly a first success.
- 1 West Indian flamingo (*Phoenicopterus r. ruber*), the second flamingo ever reared at the park.
- 6 Cuban tree ducks (*Dendrocygna arborea*), an endangered species.
- 2 Hume's bar-tailed pheasants (*Syrmaticus h. humiae*), an endangered species.
- 3 Mikado pheasants (*Syrmaticus mikado*), an endangered species.
- 2 wattled cranes (*Bugeranus carunculatus*), rarely reared in captivity with success.

- 3 white-quilled black bustards (*Afrotis atra afraoides*); the first captive breeding for this species was in 1970 at the Bronx Zoo.
- 1 tawny frogmouth (*Podargus strigoides*), rarely bred in captivity; the chick was hand-reared.
- 1 Uganda barbet (*Lybius bidentatus aequatorialis*).
- 2 Natal pigmy kingfishers (*Ispidina picta natalensis*), one of the smallest kingfishers; there are only two other breeding records.

The World of Birds was the focal point for the efforts of all the technical, artistic, and scientific staffs of the Zoo. Working in cooperation with the exhibits and construction departments, the bird staff and the gardeners perched and planted the displays, as plumbers, masons, and artists put the final touches on pools, rockwork, and painted backgrounds.

Securing a variety of tropical trees, shrubs, and vines — not to mention storing them until each exhibit reached the point of planting — was an additional and costly project. Dennis Brown, Director of Horticulture at the New York Botanical Garden, continued to serve as plant consultant for the new building.

During 1971, research continued on the behavior and development of the flightless (Ratite) birds, with special accent on the rheas (Rheiformes). Emphasis was placed on embryonic development; the incubation of a number of rhea eggs was halted at various stages for a detailed comparison and analysis of growth rate.

An unusual opportunity for another comparative study was presented when the collection's fine old pair of wattled cranes (*Buggeranus carunculatus*) produced two fertile eggs. Two viable chicks were hatched, but while the parents tended the older sibling, the younger had to be hand-reared. The successful rearing of both young cranes provided much useful data.

Banding experiments were continued during 1971 to assure individual identification of each specimen. In conjunction with this effort, new curatorial records of the living collection were designed and completed. The new system includes a record card for each individual in the collection with provision for maintaining a chronological history of the animal. Space for keeper observations and veterinary treatments are included. In time, these departmental records should constitute an invaluable source of data on the maintenance of wild birds in captivity.



# Census

Census of  
Birds  
December 31, 1971

<i>Orders</i>	<i>Families</i>	<i>Species &amp; Subspecies</i>	<i>Specimens</i>
<b>Sphenisciformes</b> Penguins	1	5	14
<b>Struthioniformes</b> Ostriches	1	2	3
<b>Rheiformes</b> Rheas	1	1	13
<b>Casuariiformes</b> Cassowaries and emus	2	2	8
<b>Tinamiformes</b> Tinamous	1	3	26
<b>Podicipediformes</b> Grebes	1	2	3
<b>Pelecaniformes</b> Pelicans, cormorants, etc.	2	5	21
<b>Ciconiiformes</b> Herons, ibises, storks, etc.	4	19	89
<b>Phoenicopteriformes</b> Flamingos	1	6	48
<b>Anseriformes</b> Swans, ducks, geese and screamers	2	79	456
<b>Falconiformes</b> Vultures, hawks and eagles	3	11	19
<b>Galliformes</b> Quail, pheasants, etc.	3	14	82
<b>Gruiformes</b> Hemipodes, cranes, trumpeters, etc.	6	27	122
<b>Charadriiformes</b> Plovers, sandpipers, gulls, etc.	9	39	175
<b>Columbiformes</b> Pigeons, doves and sandgrouse	1	7	14
<b>Psittaciformes</b> Parrots, etc.	1	13	48
<b>Cuculiformes</b> Touracos and cuckoos	1	6	20
<b>Strigiformes</b> Owls	1	12	25
<b>Caprimulgiformes</b> Frogmouths, nighthawks, etc.	1	1	6
<b>Apodiformes</b> Hummingbirds	1	6	7
<b>Coliiformes</b> Colies	1	1	4
<b>Trogoniformes</b> Trogons, quetzals	1	4	8
<b>Coraciiformes</b> Kingfishers, hornbills, etc.	6	9	20
<b>Piciformes</b> Barbets, toucans and woodpeckers	4	9	19
<b>Passeriformes</b> Perching birds	35	150	891
<b>Totals</b>	90	433	2,141

Summary: orders, 25; families, 90; species and sub-species, 433; specimens, 2,141.



*Indian Python*

## Department of Herpetology

**F. Wayne King,**  
*Curator*

**John L. Behler,**  
*Assistant Curator*

**Robert A. Brown,**  
*Assistant Curator*

**Peter J. Brazaitis,**  
*Assistant Animal Manager*

Improvement of the amphibian holding facilities during the year allowed the department to substantially increase its collection. The number of amphibian species maintained was more than double the previous annual figure. The trend toward decreasing the total number of reptile species and increasing the breeding potential of given species by developing larger breeding colonies was continued. Unfortunately, the increased burden associated with maintaining numerous donations of confiscated animals reduced our effectiveness. Therefore, the number of reptile species in the collection approximated the previous year's figure.

Acquisitions of amphibians during the year included a number of native mole salamander and woodland salamander species as well as Colorado River toads, Panama golden frogs, Mexican burrowing toads, casque-headed tree frogs, and Mexican blue-spotted tree frogs.

Significant reptile additions included a rare Haitian galliwasp, a series of prehensile-tailed Solomon Island skinks, a juvenile broad-nosed caiman, a Costa Rican bushmaster, and three young Australian taipans. The Solomon Island skinks are a rarely exhibited species and have not been present in the reptile collection previously. Broad-nosed caimans are also rarely exhibited and it is believed that there are only five other living specimens in the United States.

In addition to the many boa constrictors, red-eared turtles, and common caiman donations, an assortment of unusual gifts were received. The list included two African pancake tortoises, seven axolotls, 21 yellow-spotted Amazon sideneck turtles, two dwarf caimans, an Australian lace monitor, a Florida indigo snake, and six northern Pacific rattlesnakes.

The New York Zoological Park's oldest resident, a female Duncan Island tortoise, was returned to the Galapagos Islands. It is hoped that she will contribute to the successful breeding program at the Charles Darwin Research Station located on Indefatigable Island. The Zoo's entire Galapagos tortoise herd has now been relocated to situations where they can contribute to future generations of this species.

The faithful Egyptian cobras bred and deposited a clutch of 22 eggs in April. Thirteen of the eggs proved fertile and hatched in late June. One of the Indian pythons successfully bred and laid 34 eggs. Unfortunately,

these were unsuccessfully incubated. Breeding and hatching was noted for the vine snakes and box turtles. Other births in the collection included six red-tailed rat snakes, eight water moccasins, and four northern Pacific rattlesnakes.

# Census

Census of  
Amphibians and Reptiles  
December 31, 1971

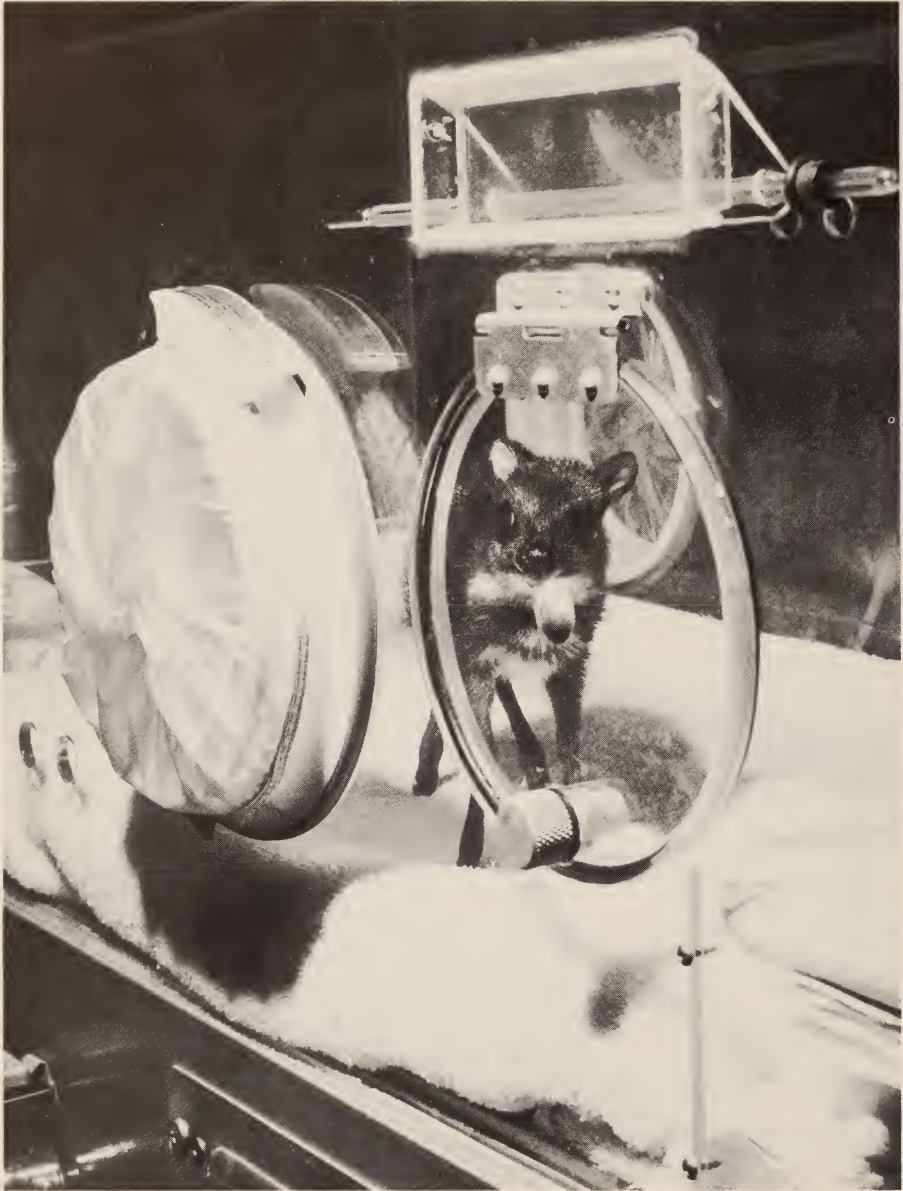
CLASS	<i>Species &amp; Subspecies</i>	<i>Specimens</i>
Amphibia	40	187
Reptilia	152	413

Summary: orders 5; families, 38; species and sub-species, 192; specimens, 600.





*South American Iguana*



*Baby Mouse Deer in Incubator*



**Emil P. Dolensek,**  
*Veterinarian*

*Consultants:*  
**John Budinger,**  
*Pathology*

**Ben Sheffy,**  
*Nutrition*

**Gary L. Rumsey,**  
*Avian Nutrition*

**Kendall L. Dodge,**  
*Ruminant Nutrition*

**Robert Byck,**  
*Pharmacology*

**Jacques B. Wallach,**  
*Clinical Pathology*

**Edward Garner,**  
**Dennis F. Craston,**  
**Ralph Stebel,**  
**Joseph Connetta,**  
*Comparative Pathology  
& Toxicology*

**Harold S. Goldman,**  
*Radiology*

**Roy Bellhorn,**  
**Paul Henkind,**  
**Alan Friedman,**  
*Comparative Ophthalmology*

**Lucy Clausen,**  
*Parasitology*

**Jay Hyman,**  
*Aquatic Mammal Medicine*

**Theodore Kazimiroff,**  
*Dentistry*

**T**he year 1971 was marked by increased expansion and productivity in the clinical laboratories of the animal hospital. The old laboratory was completely refurbished with the latest automatic tissue processing and staining apparatus in order to process tissue slides for pathology. The data accumulated thus far have advanced the comparative pathology program and helped immeasurably in recognizing related disease syndromes. Prophylactic treatments have also been instituted as a result.

In half of the old treatment room, apparatus needed to perform all hematology, bacteriology, mycology, urology, and parasitology was installed. A total of 545 cultures were determined in 1971, and several projects were initiated as a result of faster accessibility. Following reports of a high incidence of salmonella in pet turtles, all turtles in the Zoo were cultured; a 31 per cent incidence of salmonella was reported.

The parasitology monitoring program was greatly expanded during the year. A schedule of samplings was established with each department, and all animals were treated accordingly to keep parasites at a minimum.

Hematology and serum chemistry programs were accelerated. Periodic hematological and serum work-ups were performed on the white whales and white-sided dolphins at the Aquarium, all the large cats, many of the deer herds, all the turtles, and several snakes. In total, 340 hematology parameters and serum chemistries were performed. Future expansion is planned to accommodate more advanced equipment, which will further streamline these programs.

A troubling development — with implications for the future of the collections that cannot yet be assessed — was a report of high lead levels in felines and primates within the Zoo. This data resulted from studies by the veterinarian and the consultants in the Society's animal health programs. Although lead from supposedly lead-free paints was discovered in some cases, tetraethyl lead from auto exhausts appeared to be more important and beyond the Zoo's ability to control. Subsequent reports of high lead levels in New York City children revealed that concern with the polluted atmosphere is not the Zoo's alone.



*Alex, the Beluga Whale*

James A. Oliver,  
Director

Martin Grey,  
Administrative Assistant  
to the Director

H. Douglas Kemper,  
Assistant Curator

Lars Mellkvist,  
Superintendent, Operations

Charles Young,  
Animal Manager

Louis Mowbray,  
Research Associate,  
Field Biology

Christopher W. Coates  
Director Emeritus

New and improved exhibits during 1971 brought a warm response from the public, and the New York Aquarium ended the year with another increase in attendance, a 29 per cent rise. Thanks to the New York State Council on the Arts, new programs were initiated in education and attractive new illustrative materials were installed. Thus 1971 was even better than 1970, which had also been a banner year.

Among the animal exhibits, the black piranha (*Serrasalmus rhombeus*) reproduced again this year and the Aquarium won the Edward H. Bean Award of the American Association of Zoological Parks and Aquariums for "the most notable birth of a fish." Four northern fur seals from the Pribilof Islands were acquired and, added to one other youngster, made an attractive new feature exhibit in Seal Island. Seven beluga sturgeon (*Huso huso*) were received from the Volgradski Sturgeon Hatchery, U.S.S.R., through the kindness of the National Aquarium (Washington, D.C.). When adult, this interesting fish may reach a length of more than 20 feet and weigh in excess of one ton.

In the summer of 1971, a new fresh-water fish exhibit for the northern United States was opened, which consists of three large tanks: an exhibition of brook trout (*Salvelinus f. fontinalis*) and brown trout (*Salmo trutta*), representing a cold-water stream exhibit; a tank of warm-water pond fish, such as large-mouthed bass (*Huso salmoides*), bluegill (*Lepomis macrochirus*), and yellow perch (*Perca flavescens*); and a deep cold-water lake with Atlantic salmon (*Salmo salar*) and rainbow trout (*Salmo gairdneri irideus*).

Probably the most interesting new feature was the performance of Alex, the male beluga whale (*Delphinapterus leucas*), in his new home in Polar Bay. Regular training demonstrations were begun with Alex in February, soon after he was moved. By late spring he had become such an apt pupil that regular public demonstrations of his behavior were scheduled. He was soon the star of the show and the Department of Parks had to be called upon for additional bleacher stands. Approximately 500 persons can be seated at present. On sunny weekends this seating capacity is inadequate, and 50 to 100 persons have to stand for each show, proof of Alex's popularity.

Adding to the attractiveness of the Aquarium's public areas are the new directional-informational signs. These four-sided pylons, ranging in height from six feet to 22 feet, have guided visitors and provide an attractive decor. With the addition of a graphic designer and a zoology specialist, made possible by a grant from the New York State Council on the Arts, the Aquarium has greatly improved the quality of its informational materials and programs. A variety of conducted tours, lectures, and film showings have been inaugurated. The number of new developments in this area has been truly impressive; more than 30 specific new programs have been introduced. Unfortunately, as the audience increases, especially among the school-age youngsters, the Aquarium has had to turn away groups because of a lack of adequate exhibit space and luncheon room facilities. Current plans to correct these restrictive conditions include providing larger facilities and re-organizing school-group visits.

The New York Aquarium joined the shark-tagging program conducted by the American Littoral Society and participated with this group in several of their other activities. Last summer off Cape May in New Jersey, 10 large sand tiger sharks (*Carcharias taurus*) and sand-bar sharks (*Carcharhinus milberti*) were tagged in one outing by several members of the Aquarium staff and Graham MacMillan of the Littoral Society. The largest shark was nearly 12 feet in length. On another tagging trip off Montauk Point, Long Island, three mako sharks (*Isurus oxyrinchus*) and one blue shark (*Prionace glauca*) were tagged. Several small sharks obtained on other trips were sent to the Montreal and Pittsburgh Aquariums, as well as being placed on exhibition here. Exchanges also were carried out with the New England Aquarium, the National Aquarium in Washington, D.C., and the Seattle Aquarium.

Other collecting activities by the Aquarium included local trips along the south shore of Long Island. Numerous species of fish and marine invertebrates were collected for the local habitats exhibits and for exchange with other institutions. One noticeable feature was the marked decrease in local populations of some marine invertebrates. For example, sea urchins, which formerly were abundant, are now virtually non-existent in some local areas. It is suspected that this marked change results from overcollecting by several commercial companies.



# Census

Census of  
the Aquarium  
December 31, 1971

Species &  
Subspecies      Specimens

## PHYLUM: Chordata

### CLASS: Chondrichthyes (Sharks, skates, rays and chimeras)

#### ORDERS

<b>Heterodontiformes</b> Horned sharks	1	1
<b>Squaliformes</b> Typical sharks	2	5
<b>Rajiformes</b> Skates, rays	2	4

### CLASS: Osteichthyes (Bony fishes)

#### ORDERS

<b>Dipteriformes</b> Lungfishes	1	1
<b>Acipenseriformes</b> Sturgeons	1	5
<b>Semionotiformes</b> Gars	3	12
<b>Amiiformes</b> Bowfins	1	2
<b>Elopiformes</b> Tarpons, bonefishes	2	5
<b>Anquilliformes</b> Eels	5	29
<b>Clupeiformes</b> Herrings	1	1
<b>Cypriniformes</b> Minnows, piranhas, blind cavefishes	3	50
<b>Siluriformes</b> Catfishes	3	13
<b>Batrachoidiformes</b> Toadfishes	1	3
<b>Lophiiformes</b> Frogfishes	1	2
<b>Gadiformes</b> Codfishes	2	5
<b>Atheriniformes</b> Topminnows, killifishes, silversides	3	219
<b>Beryciformes</b> Squirrelfishes, soldierfishes	3	12
<b>Gasterosteiformes</b> Sticklebacks, pipefishes, sea horses	3	20
<b>Perciformes</b> Perch-like fishes	90	307
<b>Pleuronectiformes</b> Flounders	2	3
<b>Tetraodontiformes</b> Triggerfishes, puffers, cowfish, trunkfishes	5	9

### CLASS: Reptilia (Reptiles)

#### ORDER

<b>Cnelonia</b> Turtles	7	23
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### CLASS: Aves (Birds)

#### ORDER

<b>Sphenisciformes</b> Penguins	2	22
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### CLASS: Mammalia (Mammals)

#### ORDER

<b>Pinnipedia</b> Seals, sea lions	4	15
<b>Cetacea</b> Whales, dolphins	2	6

PHYLUM: Porifera		
CLASS: Demospongiae (Siliceous, horny sponge)	1	**
PHYLUM: Coelenterata		
CLASS: Anthozoa (Anemones, coral)	15	*330
PHYLUM: Annelida		
CLASS: Polychaeta (Types of marine worms)		
PHYLUM: Arthropoda		
CLASS: Crustacea (Lobsters, shrimps, crabs)	15	141
CLASS: Arachnida (Horseshoe crabs)	1	10
PHYLUM: Mollusca		
CLASS: Gasteropoda (Snails)	5	11
CLASS: Pelycopoda (Oysters, clams)	3	53
CLASS: Cephalopoda (Octopodes, squid)	1	1
PHYLUM: Echinodermata		
CLASS: Asteroidea (Sea stars)	7	43
CLASS: Echinoidea (Sea urchins)	3	11
CLASS: Holothuroidea (Sea cucumbers)	1	12
TOTAL	202	1,386

\*\* 150 colonies

\* approximately 64,800 *Aiptasia carnea*



*Tropical Marine Fishes*



*Research with Sea Urchins*



## Osborn Laboratories of Marine Sciences

**Ross F. Nigrelli,**  
*Director & Pathologist*

**George D. Ruggieri, S.J.,**  
*Assistant Director  
& Coordinator of Research*

**Martin F. Stempien, Jr.,**  
*Assistant to the Director  
& Bio-organic Chemist*

**Jack T. Cecil,**  
*Virologist*

**Paul J. Cheung,**  
*Microbiologist*

**Joginder S. Chib,**  
*Chemist*

**Kenneth Gold,**  
*Marine Ecologist*

**Myron Jacobs,**  
*Neuroanatomist*

**Klaus D. Kallman**  
*Fish Geneticist*

**William Antopol,**  
*Research Associate,  
Comparative Pathology*

**C. M. Breder, Jr.,**  
*Research Associate,  
Ichthyology*

**Eli D. Goldsmith,**  
*Scientific Consultant*

**Erwin J. Ernst,**  
*Research Associate,  
Estuarine & Coastal Ecology*

**John J. A. McLaughlin,**  
*Research Associate,  
Planktonology*

**Martin P. Schreibman,**  
*Research Associate,  
Fish Endocrinology*

**T**he oceans contain a greater variety of major types of living organisms than does the land. Indeed, some animal phyla, such as the group encompassing sea urchins, sea stars, and sea cucumbers, are exclusively marine. Other groups, which include animals such as sponges, jellyfish, anemones, and corals, are predominantly marine, having only a few freshwater representatives. This wide gamut of aquatic forms — from electron-microscopically-small viruses to magnificently-large whales — is the object of intensive studies at the Osborn Laboratories of Marine Sciences.

The laboratory of comparative pathology has become internationally recognized as a source for information on diseases of aquatic animals. Numerous, detailed studies by Dr. Ross F. Nigrelli, his colleagues, collaborators, and graduate students have shown that heavy losses in fish populations have been caused by viruses, rickettsial-like organisms, bacteria (including those that cause tuberculosis), fungi, and various parasites. In fact, it's rather unusual to find a fish that does not harbor at least one species of protozoan, helminthic, or crustacean parasite.

Fishes are also prone to benign or malignant cancers, and metabolic diseases. Such diseases may be caused by infectious agents, hormonal and nutritional imbalances, hereditary factors, ageing processes, or may be due to toxic metabolites, pesticides, industrial pollutants, and radioactive wastes. Some of these diseases and parasites of fishes are transmittable to man. No other aquarium has made such significant contributions to the understanding of disease processes in aquatic animals. The need for such expertise is highlighted by current attempts at fish farming, where large numbers of fish are maintained and grown in relatively small, restricted areas.

But it is not enough to know that some viruses deleteriously effect the health of marine animals. Studies by Dr. Jack T. Cecil deal with the molecular events which follow viral infectivity and propagation at the cellular level. Viruses and other intracellular organisms cause a variety of morphological and physiological changes at the ultracellular level. These modifications are being analyzed in such divergent cells as those of liver, intestine, and heart from numerous fish species and marine mammals, and from various organs of shrimps, fiddler crabs, sea stars, and clams.

Studies by Dr. Kenneth Gold have been designed to provide a solid base for predicting the relative abundance of some uni-cellular organisms under varying environmental conditions, including diverse pollutants. Previously unreported stages, including sexual forms, have recently been described, and the importance of these stages in species productivity and longevity is under study.

Sponges, because they have not given rise to any higher group of animal, are looked upon as an evolutionary dead end. Their mode of life is reflective of their morphology. Not only do the sponges lack organs, they actually have very little in the way of definite tissue layers. They can live only in water, and most are found in the marine environment. They are filter-feeders, and are extremely long-lived. Dr. Martin. F. Stempien, Jr., and his associates have been studying the chemistry and biochemistry of these unique primitive animals. A number of interesting substances have been obtained from a variety of marine sponges. Some of these substances are toxic to other marine animals while others elicit powerful antibiotic properties.

The barnacle is among the most important of marine fouling organisms. An ocean-going vessel pitted with numerous barnacles will be slowed down by several knots or will be forced to consume greater amounts of fuel. To develop specific inhibitors capable of preventing barnacles from adhering to ships, it is essential to know the chemical constitution of the barnacle cement. Histo-chemical studies by Paul J. Cheung have indicated that the cement secreted by the barnacle is a basic protein with only trace amounts of carbohydrates and lipids.

Studies by Dr. George D. Ruggieri, S.J., have shown that a marine worm from the Mediterranean contains a substance which determines the sex (maleness) of its young. This masculinizing substance is also quite active on other biological systems. It contains substances that can immobilize sea urchin sperm or cause abnormalities in developing sea urchins.

A gene which controls the time of sexual maturation and adult size in males in the freshwater poeciliid fish *Xiphophorus maculatus* has been uncovered by Dr. Klaus D. Kallman. This gene is located on the sex chromosome and is closely linked to the pigment genes for red body and red iris coloration. Males with red iris coloration are small and mature at approximately three months of age, while those with red body coloration grow much larger and do not reach sexual maturity until about eight months. It is not yet known whether the association of the two pigment genes with the size gene is significant or mere coincidence.

Studies on the brains of whales and dolphins by Dr. Myron S. Jacobs indicate that these marine mammals possess the ability of complex cerebral activity. The cerebral cortex of all Cetacea is more highly convoluted than in man. The cerebral cortex of man contains approximately 14 billion nerve cells; the number of nerve cells in the cetacean cortex is even greater.

In man these nerve cells are probably responsible for functions such as ideation and memory processing. If cortically mediated behavior is an adequate index of intelligence, then the structural similarity between the cortex of man and dolphin does, indeed, suggest a high degree of cetacean intelligence.

The tradition of cooperation and collaboration with scientists from other institutions (which, in the past, included such luminaries as Thomas Hunt Morgan, Jacques Loeb, and Homer Smith, to name just a few) is still a viable part of the research efforts at the Osborn Laboratories of Marine Sciences. In addition, six doctoral graduate students have conducted their theses research at the Laboratories.



*Lion Island*



## Institute for Research in Animal Behavior

**Peter R. Marler,**  
*Director & Senior  
Research Zoologist*

**Paul Mundinger,**  
*Assistant Director  
& Research Associate*

**Donald R. Griffin,**  
*Senior Research Zoologist*

**Jocelyn Crane Griffin**  
*Senior Research Zoologist*

**Fernando Nottebohm,**  
*Research Zoologist*

**Roger S. Payne,**  
*Research Zoologist*

**George Schaller,**  
*Research Zoologist*

**Thomas T. Struhsaker,**  
*Research Zoologist*

**Alan Lill,**  
*Research Associate*

**T**wenty-four investigators were active during 1971, each with his own research program, including 10 research zoologists, seven post-doctoral, and seven pre-doctoral fellows, all with appointments at the Rockefeller University. In response to the expansion in the number and variety of research problems under study, the need was felt for new facilities, and discussions were started between the New York Zoological Society and the Rockefeller University about possible methods for reorganizing the institute along somewhat different lines. Discussions continuing through the year led to a new arrangement that will come into full operation in July 1972.

Under this new plan the Institute in its present form will be discontinued. A new Society-sponsored Center for Field Biology and Conservation will come into being, with an initial staff of Dr. George Schaller, Dr. Roger Payne, and Dr. Thomas Struhsaker. All other IRAB staff will transfer to a new field station, supported by the Rockefeller University, to be created on the Innisfree Estate in Dutchess County, New York. This group will concentrate on combined field and experimental studies of local birds and mammals. The new Center will continue to represent the deep commitment of the New York Zoological Society to expeditionary field biology and conservation in many parts of the world.

Close cooperation between the Society and the University will continue, with several joint appointments and free exchange of information and advice. Participation in joint seminars will continue with a unique combination of information from field and laboratory studies brought to bear on problems in animal behavior and ecology.

In the spring Dr. Donald Griffin set up radar high on a hilltop near Millbrook, New York, to track birds migrating over the area. As in previous seasons, nights with low clouds were preferred in order to gather more data about the flight directions and orientations of birds whose vision of the ground and the sky is obscured. A major technical improvement was the development of lightweight electronic "cloud detectors." These devices, carried aloft on tethered balloons, transmit to the ground a radio signal indicating whether the detector is in a cloud. Radar measurement of the cloud detector's altitude allows determination of cloud base and cloud

top altitudes. These observations generated stronger evidence that birds do travel in appropriate migratory directions when flying in or between opaque clouds.

Jocelyn Crane Griffin's monograph, *Fiddler Crabs of the World*, is now in press, after completion of technical appendices and bibliography. A substantial appendix dealing with methods of studying fiddler crab ethology under a variety of natural conditions will be of great assistance to new students interested in the behavior, ecology, and distribution of these animals.

In one of the last projects to be conducted at the Society's Tropical Research Station in Trinidad before its closing in June 1971, Dr. Alan Lill continued to investigate the mating and social systems of two species of manakin, a tropical bird. In one species, *Manacus manacus*, Dr. Lill found that female mate-selection is based approximately equally on characteristics of the males' territories and on their phenotypes. The critical aspect of territory seems to be either its location or very subtle differences in its physical form.

Dr. Peter Marler's experimental studies on song development in the red-winged blackbird have shown that males raised in isolation from 40 days of age develop abnormal song. These songs include many normal components from which natural song could have been constructed, but are delivered with abnormal timing and order. An intensive study of the role of social constraints in song learning in the red-wings will follow the current project.

Dr. Paul Mundinger's comparative study of vocal imitation in the northern finches has shown that call imitation occurs extensively within the subfamily Carduelinae. Three genera, represented by three species, were studied both in the field and laboratory, and four more genera, represented by six species, were studied in the aviaries at IRAB. The results reveal that all seven genera are capable of learning the fine structure of their flight calls by vocal imitation of members of the same species. Laboratory experiments reveal that vocal imitation occurs during the establishment of the pair bond, between parents and their progeny, and between flock mates. Dr. Mundinger's work has provided convincing evidence that many bird calls, like bird song, are modified by learning. He is currently investigating the ontogeny of both call and song learning in the house finch.

During 1971 Dr. Fernando Nottebohm continued his studies of captive *Amazona amazonica* parrots. Three pairs laid eggs and two hatched young in the aviaries at IRAB. Information thus obtained on age of first breeding, clutch size, and significance of pair bonds formed early in life will be extremely useful for interpreting field data obtained in Trinidad. On a different project, Dr. Nottebohm has discovered that the left hypoglossal nerve plays a dominant role in song control in the canary. Current research is aimed at exploring to what extent this dominance may be reflected in higher brain centers.

Dr. Roger Payne's trip to Bermuda in the spring resulted in a new set of recordings of humpback whale songs, which reveal the whales singing a new song. A review of recordings from past seasons indicates that in each of the three years for which Dr. Payne has extensive recordings, the singing populations on the offshore banks have produced a different song. A series of photogrammetric range measurements, which give the distance of an object from a camera at the observer's location, were made on those whales being recorded. These data provide the basis for the postulation that whale sounds can be heard over fairly long distances. From July through October, Dr. Payne studied right whales in Argentina; intensive analysis of the data is underway.

Writing constituted much of Dr. George Schaller's research activities during the year. The scientific report on his three-year lion study in the Serengeti (1966-69) was submitted to the University of Chicago Press for publication in 1972. Dr. Schaller plans a long-term expedition to the Himalayas where he will study wild sheep and goats, snow leopards, and other mammals. The project will begin early in 1972 in Nepal where he will observe some of these animals for about three months. Afterwards he plans to go to Pakistan for further observations at the study sites he located on his survey trip in 1970.

For over 18 months Dr. Thomas Struhsaker has been gathering quantitative data on the behavior and ecology of red colobus monkeys in the Kibale Forest of western Uganda. Late in 1970 he hired a field assistant to undertake a comparative study of black and white colobus living in the same forest. Several differences between the two colobus species are already apparent, including social group size, daily activity patterns, and food habits.

Dr. Struhsaker's work in Uganda comprises conservation as well as research. He has proposed that the Kibale Forest be developed as a national park both for scientific studies and for tourism. While undisturbed areas in the savanna are abundantly provided by national parks, there are currently no rainforest national parks in Africa. The Kibale Forest harbors a rich variety and abundance of primates, seven species of monkey and ape and two of bushbaby. Duiker, giant forest hog, bushpig, bushbuck, buffalo, elephant, leopard, and other mammals also inhabit the forest, along with a variety of tropical birds.





*Special Class for Blind Children*



## Department of Education

**F. Wayne King,**  
*Chairman of  
Educational Programs*

**Herbert J. Knobloch,**  
*Curator*

**James W. Waddick,**  
*Assistant Curator*

**Robert A. Brown,**  
*Assistant Curator  
(Children's Zoo)*

**Karen Hensel,**  
*Aquarium Zoology Specialist*

**D**uring the year, the education department doubled in personnel, welcomed the challenge of new goals, and carried on the valuable services of its previous years. Over two-hundred-thousand school children — to be exact, 213,303 children from 7,909 classes, representing 3,869 schools — came to the Zoo as part of their curricular activities. A specific educational program in the Heads and Horns Building auditorium was presented to 8,140 children and an additional 1,994 students were given educational tours.

In addition to the direct contact with school groups, the department conducted a number of special training courses. In 1971 the forty-third and forty-fourth continuous in-service training courses for primary teachers were completed. The volunteer guide training course graduated over 60 people in its second, third, and fourth terms. These tour guides began giving tours and “mini-talks” at both the Bronx Zoo and Central Park Zoo.

Fourteen special lectures and tours were given to service groups and clubs throughout the city. A special project with the Clinton Youth Center resulted in a popular animal behavior course. Two summer workshops were conducted for members' families and for junior high school students. The coordinated school project with Bronx School District 8 was completed in June; the District 10 program will continue.

Audio-visual activities included the completion of films for the 1970 annual meeting and preparation for the 1971 meeting. Special audio-visual aids were prepared for Earth Day and for the newly renovated Great Apes Building.

“Bronx River Clean-up Day,” a pilot project under the Community Affairs Officer's coordination, took place on a limited basis late in the year. Attended by Zoo personnel, local service and ecology groups, and the Bronx Borough President, it fulfilled its goal of providing information for a more extensive Bronx River project in the future.



*A visit to the Children's Zoo*

## Children's Zoo

**Robert A. Brown,**  
*Assistant Curator*

**T**he Children's Zoo had a successful season despite the decline in attendance for the Park as a whole. Total attendance was 351,293, up two per cent from the previous record set last year. About 19 per cent of Park visitors came through the Children's Zoo during its open season: from April through October. Further emphasis was placed on opportunities for visitors to pet and feed domestic animals. A larger corral for this purpose was constructed on the site of the old guinea pig exhibit.

A new exhibit of egg hatching was installed in the nursery building, while new outdoor exhibits included improved rabbit hutches and a striking new exhibit for talking mynas. Much of the old snow fence that divided the public circulation path was replaced with a four foot high, solid display wall for temporary exhibits, including insects under magnifiers and examples of animal art.

Perhaps most successful was the renovation of the familiar Noah's Ark. Portholes were installed through which visitors, using only one sense at a time — sight, smell, touch, or hearing — have to guess what animals are inside. A sales booth called "Pets 'n' Things" was installed to provide educational souvenirs, children's animal books, and invertebrate pets. The most notable additions to the collection were a Jersey calf, "Daisy," and a friendly tamandua, "Dali."

Educational program development proceeded with the Day Care Council of New York City. Scheduled guided visits to the Children's Zoo were initiated for day care centers, and the experimental classroom animal program was extended from three centers in the Bronx to 40 centers throughout the metropolitan area.





*Label Preparation*



## Exhibition and Graphic Arts

Jerry M. Johnson,  
*Curator*

**T**he Department of Exhibition and Graphic Arts was involved in several noteworthy projects during the year, but its major effort was directed toward exhibit preparations at the new World of Birds. This building is by far the most ambitious display project yet undertaken by the Society, and it has been most rewarding for all concerned to see the transformation of years of ideas, plans, and dreams into three-dimensional realities.

The department started work in the building during the month of January and since that time, several exhibits have been completed. Others were in various stages of construction, painting, planting, or perching at the end of the year. Work continued on the New World rainforest — by far the most complex display in the building, featuring a rain storm, complete with thunder and lightning, and dominated by a huge cliff scene with a 50-foot waterfall cascading down to a meandering stream on the exhibit floor. The cliff was constructed of cast fiber glass “rock” and gunite, and measures approximately 115 feet long by an average of 45 feet in height.

The Great Apes Building was reopened to the public in March following an extensive renovation. Two new displays were completed for the opening, a hillside scene for five young lowland gorillas and an experimental “treetops” exhibit for orangutans.

Other exhibition projects of note during the year included the design and construction of a mandrill exhibit for the Central Park Zoo, the renovation of the North American Cave exhibit at the World of Darkness, and the design and development of new exhibits for the Children’s Zoo.

The graphic arts section of the department also gave considerable time to the World of Birds project. This involved printing new labels, preparing scientific drawings, and developing educational panels. In addition, graphic displays were completed for the opening of the new Bison Range, the observance of Earth Day, and the new displays at the Children’s Zoo.

Several graphic design projects got underway at the Aquarium. The most important ones were the development of a directional sign system for the public, the development of a new logo for the Aquarium, and the design of a new labeling system for the exhibits. Funding for the position of graphic designer at the Aquarium was again provided by a grant from the New York State Council on the Arts.



*Briggs at Work in the Treetops Exhibit*

## Construction and Maintenance

**Charles B. Driscoll,**  
*Superintendent  
of Operations*

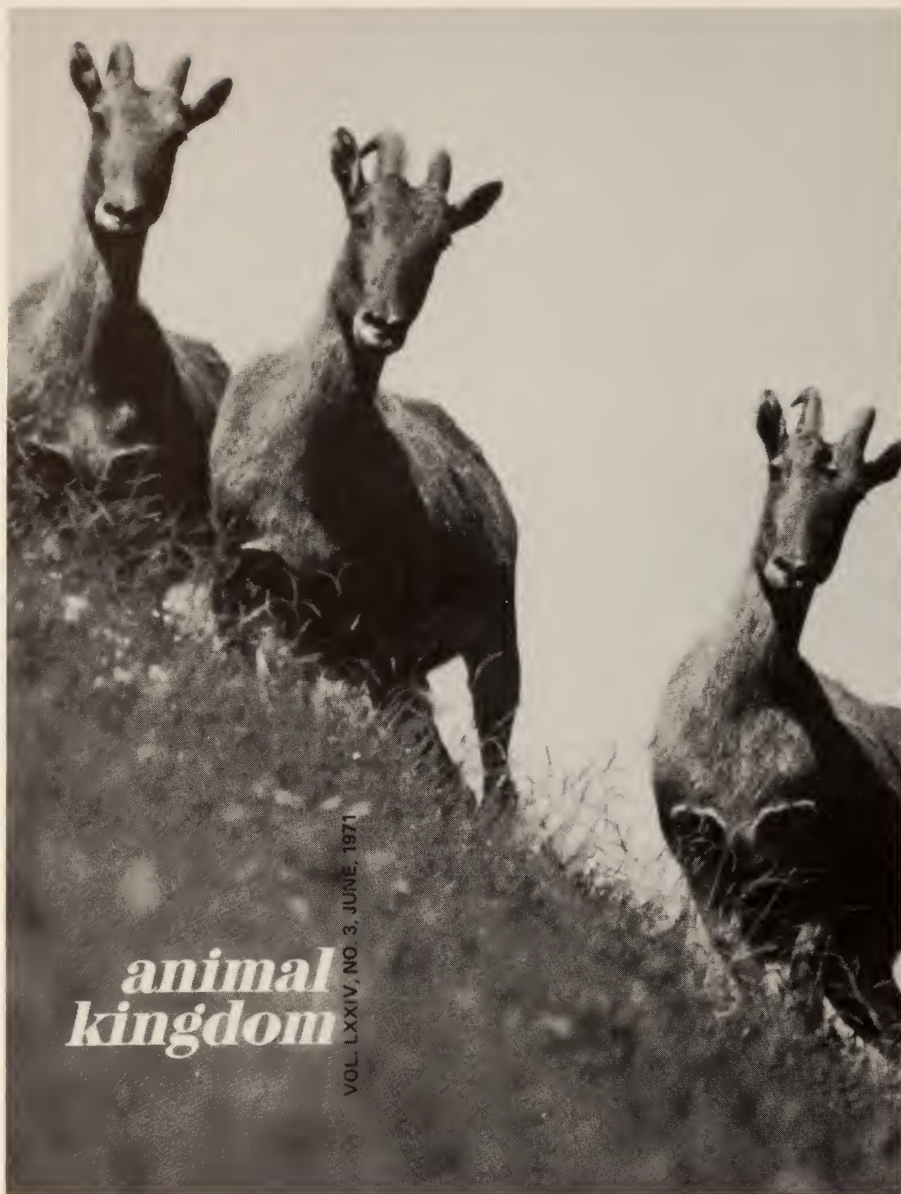
**George Russell,**  
*Assistant Superintendent  
of Construction*

**Louis Sanders,**  
*Assistant Superintendent  
of Maintenance*

**O**n September 15, 1971, the contractual work for the World of Birds building was accepted. This signaled the start of increased in-house work by Park forces to complete the exhibit work, plantings, perching, and countless other tasks to prepare the building for public opening in 1972.

In the newly renovated Great Apes Building, the battle of wits continued – oranges and gorillas versus construction and exhibition personnel. The apes were constantly detecting weaknesses in the construction of ceiling lights, grilles, gratings, and fiber glass decorations. At year's end, it looked as if the apes were still ahead.

Redevelopment of the deer ranges as breeding areas for wild horses, wisent, and Pere David deer was started, and at the African Veldt, a dry-moat was constructed. In the service yard, the old tin shed was converted to an automotive repair garage, and the equipment shed was rebuilt to garage the larger pieces of mechanical equipment. Additional fencing was installed to improve security in the wooded areas of the Zoo.



*The Magazine of the New York Zoological Society*



## Publications and Public Relations

**Edward R. Ricciuti,**  
*Curator*

**Joan Van Haasteren,**  
*Assistant Curator*

**Dorothy Reville,**  
*Photo Librarian*

**Sam Dunton,**  
*Photographer*

**William Meng,**  
*Photographer*

**Tsung S. Su,**  
*Librarian*

**William Bridges,**  
*Curator of  
Publications Emeritus*

**F**or many years the publication of *Animal Kingdom* and *Zoologica*, as well as the annual report and other materials, occupied most of the time of the department. However, with each passing year, the public relations function has become more important as the Society reaches out to present its story to as many people as possible.

While continuing to prepare six issues of the Society's popular magazine and four issues of its scholarly journal, the department prepared press releases on many features. Television and press coverage included the dramatic opening of the new American Bison Range at the Zoo and the Aquarium's shark tagging off Cape May, New Jersey. One of the most popular stories of the year turned out to be the birth of a Pere David fawn, and a favorite photograph printed across the country was that of a teaspoonful of hemipode chick. A press kit was prepared for the opening of the renovated Great Apes Building, detailing the early misadventures with "Briggs." Little did anyone realize that this was to become a continuing story.

New television commercials were filmed at the Zoo and Aquarium and distributed to stations in the metropolitan area as public service messages. Radio commercials, featuring animal sounds, were also prepared. Large posters were printed for display in railway and subway stations, and almost anywhere one traveled they were liable to see an orang from the Zoo and a zebrafish from the Aquarium. Large quantities of brochures on both institutions were also printed for distribution to turnpike display racks, supermarkets, and convention bureaus. Many staff members made personal appearances on television shows, from "Time for Joya," an early morning children's program, to the late night "Dick Cavett Show."

The Society's photographers recorded all the significant events of the year on film, and all prints were filed away in the Photo Library for future reference.

This year the Library took a giant step toward completion. The new stacks were set in place, and catalogued books finally were placed on the shelves. Within the next year, the Library should be in working order and able to make a greater contribution to the Society.



*Annual Meeting at Philharmonic Hall*

## Membership

**Harold C. Palmer,**  
*Membership Chairman*

**A**s of December 31, 1971, the membership total was 6,547. For operating economy and greater efficiency, the entire membership operation was computerized during the year. As a result, a current listing of fully-paid, active members is now available at all times. This includes the record 1,800 members enrolled in 1971.

Special members' events included the Society's first camera-safari to East Africa; the first Society film-lecture, where more than 2,000 members and guests enthusiastically received a presentation by Baron and Baroness Hugo van Lawick-Goodall on the Cape hunting dog and the chimpanzee; five Saturday special tours for members and their children; the annual members' winter meeting for approximately 4,000 at Philharmonic Hall; and the spring garden party at the Zoo, held for the first time on two consecutive days to the great enjoyment and delight of all.



*Herd of Elk at Jackson Hole*



## Jackson Hole Biological Research Station

L. Floyd Clarke,  
*Director*

**T**he 1971 program at the Research Station included seminars by visiting scientists, cooperation with a high school and a college group conducting science programs in the area, continued cooperation with the U.S. Park Service biologists on research problems of mutual concern, and more than twenty research investigations of which six\* received grants from the New York Zoological Society.

Margaret Altmann

Comparative study of communications in big game.

Stanley H. Anderson\*

Avifauna habitat utilization and vegetation structure.

John W. Baxter

Determination of levels of Cesium 137 and Strontium 90 in fleshy fungi from Wisconsin and Wyoming.

Alan A. Beetle

Ecology of aspen.

Robert C. Bergstrom

Parasites of ungulates in the Jackson Hole area.

George H. Bick and Lothar E. Hornuff\*

Survey of the odonata of Wyoming with emphasis on their altitudinal distribution.

Franz J. Camenzind\*

Ecology and behavior of the coyotes in Jackson Hole.

Brenton Costain

Ecology of the unta ground squirrel in Jackson Hole.

Raymond L. Czaplewski

Studies on the mathematical relationships between productivity and phytoplankton density.

Jane L. Dorn\*

Raven distribution, population dynamics, and ecology in Grand Teton National Park.

Robert D. Dorn

Life habits, population dynamics, and ecology of mule deer in Grand Teton Park.

K. Dale Engler\*

Ecology, behavior, and nutrition of the pika.

Howard E. Evans

Comparative ethology of solitary wasps.

Frederick J. Jannett, Jr.

Social dynamics of the montane vole, *Microtus montanus*.

James A. Mulligan

Song variation and its function in some sparrows at Jackson Hole.

Glenn A. Noble

A preliminary study of the effect of stress on snails and their larval trematode parasites.

Michael Parker

Studies on the kinetics of uptake of nitrate and ammonium by phytoplankton.

Aelita J. Pinter\*

Effects of environmental variables on some physiological responses of *Microtus montanus* under natural conditions.

Darold Sabinske

Ecology of sagebrush on the glacial outwash plains in Grand Teton National Park.

John F. Sutton

The paleontology of the Colter Formation.

# Financial Statements

## BALANCE SHEET

Exhibit A

December 31, 1971

	Current funds		Land, buildings, animals and equipment funds	Equity in land, buildings, animals and equipment	Endowment funds and funds functioning as endowment
	General	Restricted	Unexpended		
<b>Assets:</b>					
Cash	\$ 799,641	25,050	9,570	-	47,935
Accounts receivable	437,304	53,112	-	-	-
Grants receivable (note 1)	-	521,162	4,925,000	-	-
Note receivable	-	-	-	-	38,827
Pledges receivable	79,784	-	436,547	-	-
Inventories, at lower of cost or market	27,435	172,568	-	-	-
Prepaid expenses and deferred charges	28,196	9,124	-	-	-
Investments (quoted market, \$13,955,347) - (note 2)	-	-	-	-	11,294,926
Other	-	2,746	-	-	-
Due from other funds	-	519,956	797,323	-	360,108
Equipment - visitor facilities, at cost (net of accumulated depreciation of \$482,663) - (note 3)	-	-	-	344,674	-
Other land, buildings, animals and equipment (note 4)	-	-	-	5	-
<b>Total assets</b>	<b>\$ 1,372,360</b>	<b>1,303,718</b>	<b>6,168,440</b>	<b>344,679</b>	<b>11,741,796</b>
<b>Liabilities and fund balances:</b>					
Accounts payable and accrued expenses	399,492	18,119	31,705	-	-
Deferred revenue - contributions pledged for future years' operations	79,784	-	-	-	-
Due to other funds	1,677,387	-	-	-	-
Fund balances (deficit) - (Exhibit C):					
Unappropriated general fund	(784,303)	-	-	-	-
Restricted	-	1,285,599	-	-	-
Unexpended land, buildings, animals and equipment	-	-	6,136,735	-	-
Investment in land, buildings, animals and equipment	-	-	-	344,679	-
Endowment	-	-	-	-	2,446,024
Funds functioning as endowment	-	-	-	-	9,295,772
<b>Total liabilities and fund balances</b>	<b>\$ 1,372,360</b>	<b>1,303,718</b>	<b>6,168,440</b>	<b>344,679</b>	<b>11,741,796</b>

(See accompanying notes to financial statements)

# SUMMARY OF FINANCIAL ACTIVITIES

Year ended December 31, 1971

Exhibit B

Revenue:		
Fees and grants from governmental units		\$ 2,674,201
Program service fees and other revenue		1,056,455
Income from visitor facilities (after deducting \$1,466,750 of directly related costs and expenses)		683,554
Investment income		438,884
Miscellaneous (including membership dues of \$186,645)		213,321
Total revenue		<u>5,066,415</u>
Support from the public - contributions, grants and bequests		
		<u>1,204,285</u>
Total revenue and support		6,270,700
Deduct revenue and support limited by donors (Exhibit C):		
Currently expendable, but only as specified by agreement	\$ 4,593,814	
Construction and acquisition of land, buildings animals and equipment	461,376	
Endowments not expendable, to be maintained for the production of income	35,038	
Total limited revenue and support	<u>5,090,228</u>	
Amount available to finance current general expenditures		<u>1,180,472</u>
Expenditures:		
Program services	4,806,630	
Supporting services	521,628	
Major acquisitions of land, buildings, animals and equipment	1,463,324	
Total expenditures	<u>6,791,582</u>	
Deduct expenditures financed by special funds (Exhibit C):		
Current restricted funds	\$ 3,769,715	
Unexpended land, buildings, animals and equipment funds	1,463,324	5,233,039
Expenditures financed by current general revenue and support		1,558,543
Excess of current general expenditures over related revenue and support		<u>378,071</u>
Deduct transfers:		
To unexpended land, buildings, animals and equipment funds - net income from aquarium's visitor facilities	150,839	
To funds functioning as endowment - contributions designated by Trustees for general development	255,393	
	<u>406,232</u>	
Decrease in unappropriated current general fund (Exhibit C)		<u>\$ 784,303</u>

See accompanying notes to financial statements.



# STATEMENT OF CHANGES IN FUND BALANCES

Exhibit C

Year ended December 31, 1971

	Current funds		Land, buildings, animals and equipment funds	Equity in land, buildings, animals and equipment	Endowment funds and funds functioning as endowment	Funds functioning as endowment
	General	Restricted	Unexpended		Endowment	
Balance (deficit) at beginning of year	\$ (584,089)	1,346,772	6,232,262	355,665	2,485,693	9,918,814
Additions:						
Current revenue, expendable only as specified by agreement	-	4,593,814	-	-	-	-
Contributions, grants and appropriations for unexpended land, buildings, animals and equipment fund	-	-	436,802	-	-	-
Investment income	-	-	18,402	-	-	-
Equipment acquisitions	-	-	-	24,864	-	-
Endowment bequest	-	-	-	-	35,038	-
Other	-	-	6,172	-	-	-
Total additions	-	4,593,814	461,376	24,864	35,038	-
Deductions:						
Decrease in unappropriated current general fund	784,303	-	-	-	-	-
To finance expenditures of current funds	-	3,769,715	-	-	-	-
Indirect costs recovered on research grants	-	121,530	-	-	-	-
Amounts expended for land, buildings, animals and equipment	-	-	1,463,324	-	-	-
Provision for depreciation	-	-	-	35,850	-	-
Loss on disposal of investments, net	-	-	-	-	72,800	290,470
Other	-	7,267	-	-	1,907	4,769
Total deductions	784,303	3,898,512	1,463,324	35,850	74,707	295,239
Transfers between funds	584,089*	(756,475)	906,421	-	-	(327,803)
Balance (deficit) at end of year	\$ (784,303)	1,285,599	6,136,735	344,679	2,446,024	9,295,772

\*Transfers from current general fund are reported on Exhibit B, except for this sum representing the deficit at the beginning of the year appropriated from funds functioning as endowment.

NOTES TO  
FINANCIAL  
STATEMENTS

December 31, 1971

- (1) Grants receivable of the current restricted and unexpended land, buildings, animals and equipment funds represent amounts pledged to the Society for certain operations and for the completion of designated projects in future years. The grants will be collected as expenditures for the designated projects are made by the Society.
- (2) Investments are stated at cost or, if acquired by gift, at fair market value at dates of acquisition.
- (3) Equipment of the visitor facilities in use at December 31, 1971 is being written off over its estimated useful life on a straight-line basis.
- (4) Expenditures for land, buildings, animals and equipment have been charged to operations and to unexpended land, buildings, animals and equipment funds. However, only the cost of equipment of the visitor facilities has been capitalized in the land, buildings, animals and equipment fund. Other such assets including, but not limited to, the following are recorded in this fund at the nominal value of \$5.
  - National collection of heads and horns,  
art gallery, library and sundry items
  - Collection of living animals
  - Coney Island real estate
  - Land and buildings made available by the  
City of New York
- (5) The New York Zoological Society and the City of New York have agreed to construct an aquarium, as funds become available, at an estimated total cost (to be shared equally) of \$7,100,000, of which the initial stage (of approximately \$1,550,000) was completed May 31, 1957.
- (6) There are two pension plans, covering substantially all of the Society's full-time employees. The total pension expense for 1971 was \$126,263. The Society's policy is to fund pension cost accrued, and no unfunded past service cost or unfunded vested benefits existed at December 31, 1971. The assets of the pension fund, which approximated \$2,900,000 at December 31, 1971, are not recorded in the accompanying financial statements.
- (7) The Society is the ultimate beneficiary under a trust held by Community Funds, Inc. of New York, N. Y. Basically, the income arising from the investments of the principal sum is paid to the Society for current restricted purposes.

The Board of Trustees  
New York Zoological Society:

We have examined the balance sheet of New York Zoological Society as of December 31, 1971 and the related summary of financial activities and statement of changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, except for the valuation of certain fixed assets as described in note 4 of notes to financial statements, the accompanying financial statements present fairly the financial position of New York Zoological Society at December 31, 1971 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on basis consistent with that of the preceding year.

*Leat, Marwich, Mitchell & Co*

March 10, 1972

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*Photographer*

William Meng,  
*Photographer*

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*Librarian*

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Jackson Hole Biological  
Research Station  
Founded by the New York Zoological  
Society in 1947 and under the  
sponsorship of the Society and  
the University of Wyoming

L. Floyd Clarke  
*Director*

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